by Wm. J. Clench, in 1915, per Museum of Zoology, Univ. of Michigan; markedly elongate, about 18 mm. long.

12502: Palmer Lake, Vilas Co., Wis., collected by Joe E. Morrison, in 1929; 16 mm. long.

11602: Chautauqua Lake, N. Y., collected by Dr. F. C. Baker, in 1927, rather short form, 15 mm. long; a rather southern station.

Even as restricted, *S. sulcatum* is still very "variable". E. g., there is a form: very large, 20-23 mm. long, of well rounded outlines, strongly and evenly inflated: this is probably what T. Prime had named *giganteum*. Specimens are in the M. C. Z. collection, and probably in others, from the Hudson River, the Holston River, from Hull, Quebec: Nepean, Ont. Another extreme form, *planatum* St., small, e. g., 13:9.5:6.5 mm., slightly inflated, with the peripheral parts of the valves flat, shell and hinge very slight, color light grayish: from northern Indiana, Michigan, etc., the two, side by side, would be taken for distinct species. And there is one, apparently a regional subspecies, which had been named in manuscripts for many years *dakotense:* of medium size, r. rounded-elliptical, beaks rather median and little prominent: color, dark reddish brown: from Wisconsin and Minnesota to Dakota. There are a few others, more different, with possible claims for specific rank, each represented by several entries, waiting for additional evidence as to their standing.

NEW AND PROBLEMATIC WEST AMERICAN LAND-SNAILS

BY H. BURRINGTON BAKER

This paper is mainly founded on land-snails which were collected during a trip to the Pacific States in the summer of 1929. Because of its anatomy, *Macrocyclis hemphilli* W. G. B. from Washington and Oregon is removed from *Haplotrema* (Haplotrematidae) and made the monotype

of a new genus, *Megomphix*, and a new subfamily, Megomphicinae, in the Zonitidae. On the basis of preliminary dissections, the genus *Pristiloma* is considered a close relative of the European *Vitrea* (Zonitidae); *Ogaridiscus* is made a section of *Pristiloma;* and *P. nicholsoni*, which is a new species from California, *Vitrea johnsoni* Dall (=*Pristiloma taylori* Pils.) from Washington, Oregon and Vancouver I., *Hyalina subrupicola* Dall (Utah), *Vitrea subrupicola spelaea* Dall (Cal.), *Tonites wascoensis* Hemphill (Ore.; also Idaho and Montana?) and *Helix chersinella* Dall (Cal. and Ore.) are added to the genus. *P. arcticum* is reported from subalpine slopes of Mt. Ranier, Wash. A new species of Endodontidae, *Radiodiscus abietum*, is described from Idaho and, because of its aberrant anatomical structure, is made the monotype of a new subgenus, *Radiodomus*. Types are in the Academy of Natural Sciences of Philadelphia.

MEGOMPHIX HEMPHILLI (W. G. Binney), new genus.

Macrocyclis hemphilli W. G. B. (1879, Ann. N. Y. Acad. Sci. 1: 356, pl. 15, fig. M), Olympia, Wash.

Last July, Mr. Allyn Smith of Berkeley, Calif., called to my attention two shells of this species from Riverdale, Ore., which he thought resembled the Zonitidae more than the Haplotrematidae. After several days' search at this place, I found a few living specimens on Aug. 4 and 5, 1929 (No. 149980, in Acad. Nat. Sci., Philadelphia).

Riverdale is a suburb of Portland, on the left bank of the Williamette River near the southern boundary of Multnomah County. The estivating individuals of *M. hemphilli* burrow a few inches into the loose loam under fallen logs on quite steep hillsides, which are dominated by *Pseudotsuga-Tsuga* forest. They usually live under those trunks which are supported off the ground by other debris, which insures the snails plenty of air and comparative freedom from excessive accumulations of decaying humus.

Animal: practically without pigmentation. Foot: aulacopod, medium in size and rather elongate; broadest near

posterior end; pedal grooves double, prominent and with broad interstitial gyrus; sole tripartite to near posterior end, with middle zone about half as wide as either lateral one; locomotion not observed because animals were very sluggish. Tail: wide and dorsoventrally flattened; tip broadly rounded and very slightly emarginate; gland orifice quite large and diamond-shaped; peripodial angle broad, low and emarginate. Mantle collar (pl. , fig. 4).: complete, relatively broad and swollen in palatal region but narrow in columellar; right pneumostomatic neck-lappet large; left one small and claw-shaped; accessory left lappet widely separated and vestigial. Lung (fig. 4) : about 3 times as long as its base or about 4 times length of kidney; principal pulmonary vein large but abruptly divided into a fan of tributaries before it reaches pneumostome; other branches stronger on columellar than on hindgut side; minor venation indistinct. Pericardium: unusually large, with over half its length outside of lung. Kidney: slightly longer than its base and about length of pericardium; thick and with almost half its bulk posterior to lung wall; ureter complete; external ureteric opening under a flap alongside of anus, which empties into a groove to right of inner end of pneumostome.

Ovotestis (fig. 3) : eight groups of irregularly clavate alveoli, imbedded in lower half of liver; duct long, swollen except at ends; convoluted region short; talon exceptionally long, slender fusiform; carrefour imbedded. Albumen gland: brownish cream-colored, firm and shining. Uterus: long and quite slender, closely sacculate. Free oviduct: light cream-colored, of medium length, with heavy walls; joined near its base by a large, cream-colored, ellipsoid caecum, which has a spacious lumen and thick walls (A), that are longitudinally plicate internally. Spermatheca: sac obovate, imbedded near base of albumen gland; duct of long type, columellar in position but passing to right of oviducal caecum; slightly expanded at base. Vagina: whitish, exceptionally long; almost completely encircled near its

upper end by a heavy muscular collar (without lumen) that is white and shining; no distinct glandular development. Prostate: of long type. Vas deferens: swollen along free oviduct; slender where it is forced into penioviducal angle by right eye-retractor; juxtaposed along entire length of penis. Epiphallus (B, C): slightly enlarged, with quite thin wall, which develops into a pilaster along side opposite penis and into a vague corona of low, knobby thickenings near termination; opening by a simple pore on one side of penial apex. Penis: long but quite slender, thickest near apical end; lumen large; walls with numerous, beaded, longitudinal plicae, two of which form heavier pilasters in apical fifth and partially separate a narrow compartment that receives opening of vas deferens. Penial retractor: insertion on penial apex; origin high on diaphram. Cloaca: very short; external opening just behind and slightly below base of right ommatophore.

Mantle retractor: exceptionally heavy. Columellar muscle gives off: (1) buccal retractor which is almost free, (2, 3) heavy, right and left free retractors almost at origin and continues as (4) broad but thin tail fan. Buccal: divided near posterior end of buccal mass into bipartite ventral fan and two, tripartite lateral ones. Left free: divides a short distance below origin into subequal lateral and tentacular retractors; tentacular subdivides near posterior end of buccal mass into small ocular and large inferior retractor, both of which send darkly pigmented anastomoses to base of ommatophore. Right free: similar to left but with all subdivisions anterior to posterior end of buccal mass and with pedal fan much heavier, although not closely associated with uterus; ocular retractor and basal anastomoses passing through penioviducal angle.

Buccal mass: fairly small, ellipsoid. Salivary glands: about 2½ times as long as buccal mass and quite slender (smaller than in carnivorous pulmonates); almost bilaterally symmetric; anterior ends above buccal mass and oesophagus; posterior ends enveloping oesophagus; ducts

arising laterally, near middle of each gland. Jaw (fig. 2): irregularly crescentic; heavy and brownish but quite narrow; weakly and closely rib-striate (i. e., showing vestiges of primitive plaits); growth-lines sharp. Radular formula (fig. 1): 6-12-9-1-27. Transverse rows: 113 counted; almost horizontal in lateral fields, anterolaterally oblique in marginal and again horizontal in outer marginal region. Central: slightly asymmetric, broad and heavy, a little larger than first lateral; tricuspid with broad mesocone. Laterals (1-9): heavy and broad; inner ones almost tricuspid (entoconal plate weakly notched); outer ones intergrading with marginals. Marginals (10-21): much narrower although scarcely longer than laterals; bases much shorter; bicuspid with lanceolate mesocone and small, raised ectocone. Outer marginals (22-27): much shorter than inner; bicuspid or sporadicly with double ectocones; outermost vestigial.

The well-marked pedal grooves of this species place it with certainty in the Aulacopoda. The caecoid diverticulum of its free oviduct is a very peculiar feature. The spacious lumen and internally plicate walls as well as the position of this organ are very different from the structural peculiarities of a Zonitid dart-sac or pugio. Both this oviducal caecum and the reflected epiphallus are somewhat similar to the conditions in the holopod *Strophocheilus oblongus* (Acavidae; cf. H. B. B.: 1926, Oc. P. Mus. Zool. Univ. Mich. No. 167: p. 22, pl. 15).

I cannot believe that W. G. Binney ever saw the radula of this species, as it has no resemblance to that in the Haplotrematidae. Except for the slight elongation of the inner marginals, the teeth are not unlike those in some Endodontidae. Its tripartite sole is perhaps the best reason for the inclusion of this species as a primitive member in the Zonitidae. But, its very peculiar dentition and its oviducal caecum separate it from either the Tanychlamydinae or the Euconulinae, which are perhaps its closest relatives. For these reasons, *Macrocyclis hemphilli* W. G. B. is now

made the monotype of a new genus, *Megomphix,* and of a special subfamily, the Megomphicinae.

(To be continued)

Explanation of Plate 5

All figures are drawn with aid of camera lucida. Uppermost scale is for figs. 5-7 and represents one millimeter; next for figs 4 (5 mm.) and 1T (200 microns), third for fig. 2 (.5 mm.), fourth for fig. 3 (5 mm.) and lowest for fig. 1 (50 microns).

Fig. 1. *Megomphix hemphilli.* Radula: central and 1st lateral slightly separated laterad; also 7th, 14th, 21st and 23rd teeth. Hairline (T) gives shape of right half of a transverse row, with borders of each tooth indicated.

Fig. 2. *M. hemphilli.* Jaw.

Fig. 3. *M. hemphilli.* Genitalia, dissected and separated; also transverse sections through: (A) oviducal caecum between apical and middle thirds of its length, (B) vas deferens (left) and penis at their confuence and (C) vas deferens and penis a short distance below their junction (less enlarged).

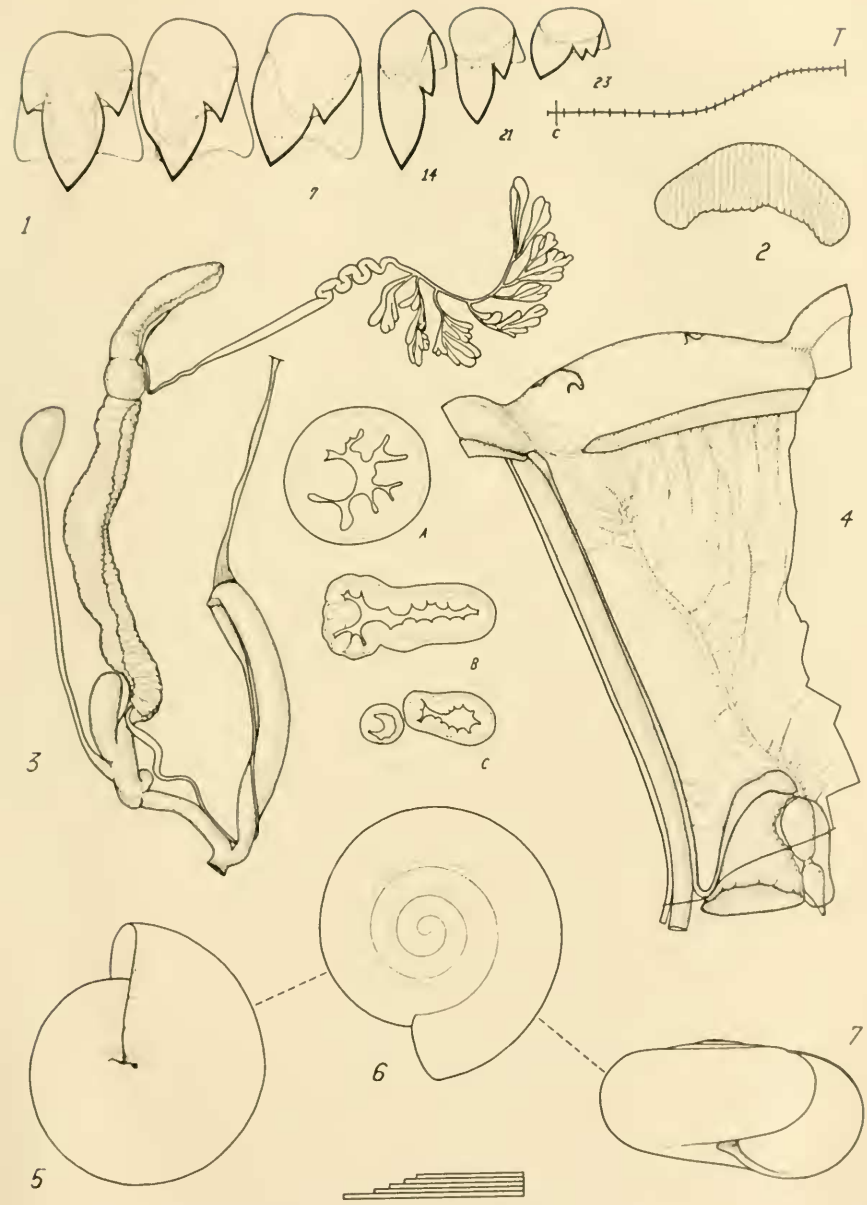
Fig. 4. *M. hemphilli.* Internal view of pallial complex, pinned out nearly flat. Curved line that crosses pericardium and kidney indicates position of posterior lung-wall.

Figs. 5–7. *Pristiloma nicholsoni.* Umbilical, apical and profile views of cotype shells; fig. 6 represents a different specimen from that in figs. 5 and 7.

Plate 6

Uppermost scale is for fig. 6 and represents 1 mm., next for figs. 2-4 (1 mm.), third for figs. 1 (10 microns) and 1T (50 microns), fourth for fig. 5 (1 mm.) and lowest for fig. 7 (1 mm.).

Fig. 1. *Radiodiscus (Radiodomus) abietum.* Radula: central and 1st lateral in natural relations; also 7th, 14th and 18th teeth. Hairline (T) gives shape of right half of a transverse row with borders of each tooth indicated.



1-4, Megomphix hemphilli. 5-7, Pristiloma nicholsoni.